Teaching Suggestions: Geology Activity #10

Rockslide!

Background Information:

What causes rock to fall? It is the combined effect of many factors and many events over a long period. The structure of granitic rock predestines it to fall. Millions of years ago, granite formed many kilometers below the Earth's surface under tremendous pressure. As the overlying rock was eroded away to expose the granite, this pressure was reduced, allowing the rock to expand. The rock broke along newly formed joints as it expanded. Rocks would later break loose along these newly formed fractures.

Rainwater is naturally acidic due to carbon dioxide in the air and over time weathers the fractures in the rock. Water seeping into fractures and cracks freezes at night and during the winter. The water expands as it turns into ice and forces open the joints a little more each winter season. This process is called frost wedging.

Roots of plants and mosses penetrate into cracks in the rock searching for soil, water, and nutrients. In the process they release organic acids that contribute to the chemical weathering of the granite. As the roots continue to grow, they force the fractures open even more, adding to mechanical weathering.

Carbon dioxide released by decomposing lichens reacts with water to produce carbonic acid that breaks down the rock and minerals. Also, granite high above the floor of Yosemite Valley is constantly being pulled downward by gravity. It is a combination of processes and events that causes rock to fall. Rockfall occurs frequently in Yosemite and continues to change the face of Yosemite.

Concepts:

- Review and application of concepts of mechanical and chemical weathering.
- The processes that cause rockfall happen continuously.
- The way Yosemite looks is always changing because the only constant in Yosemite is change.

Vocabulary:

lichen, frost wedging, gravity, chemical weathering, mechanical weathering, carbonic acid

If You are Taking the Virtual Hike

This activity contains two interactive questions in which students examine photographs of rockslides that they would encounter on the trail. The program presents immediate feedback to the answers and suggests a hint after a first incorrect answer.

If You are Visiting the Park and Hiking the Trail

Materials:

Field Journals created in class

Site:

Any site with an old rockslide next to a new rockslide. Mirror Lake is one of the most accessible (stop #10 on the Mirror Lake trail map). A rockslide that occurred on November 17, 1996 is next to the trail on the north side of Mirror Lake. This recent rockslide is next to an old rockslide and is an excellent place to do a comparison between new vs. old changes.

The new rockslide is made up of talus and boulders that are lacking lichens, mosses, or plants. There are also no trees growing in the path of the recent rockslide. The old rockslide site has boulders covered with a thick growth of lichen and mosses, and mature trees are growing among the boulders. If you are facing the new rockslide, the old rockslide is next to it on the left.

Time:

20 minutes

Activity:

Have students physically examine and compare the two rockslide areas and record the differences between the two sites. Do not tell them they are looking at two different rockslide sites yet. Ask them to come up with a hypothesis on what happened in the two areas and if what occurred happened recently or a long time ago.

Most will determine they are looking at two separate rockslides, and one is a more recent rock slide (little or no plant growth) and one is much older (a lot of plant growth). Once you have listened to their hypotheses, have them use their journals to write and use drawings to explain all the possible factors that caused these rocks to fall. They have learned about most of them while doing the on-site program activities. There are many factors involved in rock falls, including plant roots penetrating cracks in the rock, acids released by carbon dioxide reacting with water (naturally acidic rainwater or lichens releasing carbon dioxide), water freezing and expanding (frost wedging), and gravity.

This is a great spot to conclude the program and an area where you can graphically point out that, as long as there is rock in Yosemite, it will fall because the processes that cause rockfall happen continuously. The way Yosemite looks is constantly changing because the only constant here is change.